Clean Air Facts

# MTE and PTE Calculation Examples

*SBCA-APG5-0802*

A facility that requires an Air Pollution Permit will encounter the terms Maximum Theoretical Emissions (MTE) and Potential to Emit (PTE). *(If you are unfamiliar with the Air Pollution Permit process, read the SBCAAP fact sheets discussing Construction Permits or Operation Permits before reading this sheet.)* MTE and PTE are legally defined terms to describe different levels of emissions from a facility. Correctly calculating the values for MTE and PTE is very important in determining which type of permit may apply. This sheet will explain some of the key differences in calculating these values.

## *Maximum Theoretical Emissions or MTE*

There are two different definitions for MTE in the Wisconsin Administrative Code NR 400-499 series - the air pollution rules. Anything defined in chapter NR 400 is the definition that holds for all other chapters in the series, unless defined specific to a chapter or chapters.

### MTE Definition #1

The definition of MTE in ch. NR 400 basically states that MTE is how much your facility could emit if it were operated at full capacity for 24 hours per day and 365 days per year (8760 hrs/year). MTE does allow for a design that somehow limits the source from operating a full 8760 hours or reasonable operating conditions that otherwise restrict those emissions. MTE also must account for the raw material with the highest air pollutant content available to the source as if it were used all the time. The annual rate is important for determining which type of operation permit to apply for, but an hourly rate is key for figuring out if you're exempt from either construction or operation permit requirements. You can't necessarily use the reasonable operating conditions to restrict hourly MTE unless they truly affect the operations each hour (see the example on the next page).

An example used most frequently is operation of a paint spray booth. The maximum theoretical emissions would be operating the spray gun at full open and using the coating with the highest volatile organic compound (VOC) content the source could spray or apply continuously for 24 hours per day, 365 days per year (8760 hours per year). The VOC content of a coating is found on Material Safety Data Sheets (MSDS) that are always provided by the manufacturer or supplier of the coating.

If the highest VOC content coating has 5.60 pounds VOC per gallon and at full open, the gun can spray 14 gallons per hour, the MTE for that paint spray booth would be:

14 gal/hr x 5.6 lb VOC/gal = 78.4 lb VOC/hr
78.4 lb/hr x 8760 hr/yr ÷ 2000 lb/ton =
**343.4 ton VOC/year**

If the facility used a coating with low VOC content -- in this example 2.4 lb VOC/gal -- their emissions would be:

14 gal/hr x 2.4 lb VOC/gal = 33.6 lb VOC/hr
33.6 lb/hr x 8760 hr/yr ÷ 2000 lb/ton =
**147.2 ton VOC/year**

In cases involving processes without clearly defined maximum production capacities, design capacities or federally enforceable permit limits; MTE can be projected from actual VOC emissions based on the MTE of associated processes that have defined

WISCONSIN DEPARTMENT OF COMMERCE

FROM THE SMALL BUSINESS CLEAN AIR ASSISTANCE PROGRAM
P.O. BOX 7970 • MADISON, WI 53707 • (608) 267-9214 • (608) 264-6153

maximum production capacities, design capacities or federally enforceable permit limitations. Using the example of MTE for cleaning operations on a coating line, you can estimate the MTE by looking at a maximum production or design capacity operating scenario for the coating line and using whatever information is available including production and maintenance records to establish the cleaning operations schedule.

For example, assume that historically one production cycle (seven hours of production and one hour of cleaning) occurs daily and the production area is cleaned after each production cycle. However, if three production cycles (twenty-one hours of production and three hours of cleaning) could be completed daily under a maximum production scenario, one can assume three times the quantity of cleaning materials are required daily which would triple the actual emissions from cleaning materials. Perhaps, historical production records indicate that under a maximum production scenario, cleaning of the production area is necessary only after every other production cycle. This practice would be taken into account in the MTE calculation.

Calculating the total MTE of VOCs for their operations would require doing this type of calculation for every process at a facility that emits VOCs, for both the hourly and annual MTE. *The facility-wide MTE of each pollutant is the sum total of the MTE from all processes at the facility that have emissions of that pollutant.*

Reasonable operating conditions that can be taken into account for MTE **do not** include operation of a control device or restrictions taken on the operations at the source (like hours per year or gallons per year). They can only be things specific to the design of the operations. For a construction permit, this would be difficult to do since there is no operational track record for a new process.
For example:

➢ If a process line must be taken off-line for two weeks of every year for regular maintenance then it can only operate 8424 hours per year.

14 gal/hour x 5.6 lb VOC/gal x 8424 hour/yr ÷ 2000 lb/ton = **330.2 ton VOC/year**

➢ A painting operation applies paint to very large parts and only one part can be painted each hour because it also must dry within the paint booth before anyone can touch it to bring in the next part. The hourly paint spray rate is limited to the gun operating at full open for the time it takes to paint their largest part during that hour. For this example, they paint for 15 minutes at most in any hour:

1) (14 gal/hr x 0.25 hr) + (0 gal/hr x 0.75 hr) ÷ 1 hr = **3.5 gal/hr**
2) 3.5 gal/hour x 5.6 lb VOC/gal x 8760 hour/yr ÷ 2000 lb/ton = **85.8 ton VOC/year**

Conditions like these used to determine MTE must be documented to show DNR and EPA that they cannot be altered or changed in any way without requiring a construction permit.

➢ Certain control measures may be used to determine MTE if they are not used **solely** for reducing air pollution. For example, a material drying process that includes a baghouse to collect and package the final product. While the baghouse would also reduce air emissions from the product being dried, that is not its primary purpose. In Wisconsin, the DNR defines this scenario as controls that are "**part of the process**". Contact your local DNR office to ask if you meet the criteria for this scenario. Decisions are made on a case-by-case basis to establish whether the control is truly part of the process.

## MTE Definition #2

The second definition of MTE is in chapter NR 419 of the Wisconsin Administrative Code and is ***only used*** in relation to complying with any of the organic compound rules in chapters NR 419-425. Many of the exemptions from requirements in ch. NR 419-425 are based on the MTE of VOCs from the specified process type. For these rules, a facility could take restrictions on their MTE to below the exemption level that applies to their process (painting and coating, printing, fabric coating) and avoid the requirements in those chapters.

Any limitations on the MTE (#2) will need to be included as conditions in a permit. The limits can include restrictions on raw material use, hours of operation, pollution content in raw materials (i.e., VOC content in inks or coatings) or a combination of these. Control devices **cannot** be taken into account for these limitations, unless they are considered "part of the process". Including control devices when "part of the process" is the same as allowed in MTE definition #1.

This definition of MTE (#2) specifies that it does not allow restrictions to extend longer than a one-month period, but does allow monthly averaging for up to 12 consecutive months. It is important to understand this second MTE definition because, even if the process specific MTE (#2) is restricted in a permit to avoid the requirements in chs. NR 419-425, it doesn't necessarily mean that the facility-wide MTE(#1) has been restricted sufficiently to avoid other requirements. Restrictions on the facility-wide MTE (#1) to reduce your PTE are explained as follows.

## *Potential to Emit or PTE*

PTE is used to establish the type of operation or construction permit a facility is issued. There are three types of permits that can be issued.

### Major Source

An existing facility with PTE greater than the **major** source level is issued a Part 70 operation permit. The operation permit major source level for criteria pollutants (particulate matter, nitrogen oxides, sulfur dioxide, carbon monoxide, and ozone[1]) is 100 tons per year. The major source level in construction permits is 250 tons per year unless you're in one of 27 specific source categories and then it's 100 tons per year.

The major source levels for construction permits are the same as the operation permits levels for all sources in a county that is considered ***non-attainment*** for a National Ambient Air Quality Standard (NAAQS). The following table shows the levels for operation permits and nonattainment construction permits:

| | |
|---|---|
| ❑ Any single criteria pollutant, except for: | **100 tons/year** |
| ❑ Volatile organic compounds (Only in Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha Counties) | **25 tons/year** |
| ❑ Any single hazardous air pollutant | **10 tons/year** |
| ❑ Total of all hazardous air pollutants | **25 tons/year** |

Note that the major source level for VOCs is only 25 tons per year in the southeastern counties in Wisconsin considered non-attainment for ozone. The PTE of hazardous air pollutant (HAPs) emissions -- the 188 HAPs listed by EPA in the 1990 CAAA -- also define whether an existing facility is a major source.

### Minor Source

A source whose PTE is below the major source level without setting any artifical restrictions on it, is a **minor** source. For any sources that are not actually at this point, it might be useful to investigate ***pollution prevention*** (P2) measures that reduce emissions by changing the way a process creates or generates emissions. Many solvent-based coating operations have found ways to change to either water-based coatings or UV coatings or powder coatings. Each of those process changes will reduce the emissions from a painting operation to different degrees and are more or less successful depending on the media to which the paint is applied.

By changing a process, a major source could eventually be considered a minor source even if that is not the case at the time a permit application is initially submitted. Often such changes can take years to go from investigation to implementation. When the facility has completed changes and can operate as a minor source, they can apply to the DNR Air Program to revise their operation permit and get it changed to a Minor Source permit.

*You can contact groups like the UW-Extension Solid and Hazardous Waste Education Center at 414/227-3160 or 715/346-2793, or the DNR's Bureau of Cooperative Environmental Assistance at 608/267-3125 to find P2 information for your business.*

### Synthetic Minor Source

If a source has PTE below the major source level because they have agreed to limit their operations (e.g., operating only 6000 hours per year, or using only so much paint each month) they are called a **"synthetic minor"** source. The permit for a synthetic minor source will contain those limits used to keep their PTE below the major source and there may be other conditions necessary to demonstrate that they stay below the restrictions at all times.

### PTE Limits

Limits on PTE can take many forms, due to the variety of sources that make use of the option. The limits can be set to provide some flexibility to the facility but they are often balanced by some additional work required on their part to prove compliance on a continuous basis.

---

1 VOCs are regulated as precursor for ozone.

Limits set as hours of operation or raw material usage are the least flexible in terms of how much a facility is allowed to emit, but the most flexible in that minimal records are required. *Hours of operation* or *raw materials used* can be set on a monthly basis and then simple monthly records are required. This is more restrictive on the amount the facility can emit by not allowing an averaging of periods when their emissions are higher with those when they are lower. If a business is very consistent all year, this option may work well for them.

The *raw materials used* restrictions are usually combined with a limit on the pollutant content within that raw material. This part of a limit might set up more restrictive records because the facility will have to show that each container or batch of raw material received does not contain more than a certain amount. This is usually seen in a couple similar forms:

- ❑ X gallons of paint/ink/coating used per month, with no more than Y pounds VOC per gallon in each; OR
- ❑ A gallons of fuel oil burned per month, with no more than B% sulfur content by weight.

For the Y pounds VOC per gallon limit on coating content, the facility would have to agree to set that at a particular level or use an applicable limit in the Wisconsin Administrative Code. For example, one rule in the Code specifies that any paper coating operation must meet a level of 2.9 pounds VOC per gallon. That limit combined with X gallons of coating used may be sufficient to make them a synthetic minor source. If it's not, the facility could elect to meet a lower level, such as 2.5 pounds VOC per gallon:

2.9 lb VOC/gal x 75,000 gal/mo / 2000 lb/ton
= **108.7 tons per year**
2.5 lb VOC/gal x 75,000 gal/mo / 2000 lb/ton
= **93.75 tons per year**

So the 2.5 pounds VOC per gallon limit on the coating content will make them a synthetic minor source at less than 100 tons per year, whereas the limit from the rule will not. If the facility agrees to use less coating per month they can use the 2.9 pounds VOC per gallon coating. The facility may find that the extra flexibility in usage is more advantageous. Using the lower VOC content coating is also a good way to adopt pollution prevention.

Limits set as an *emissions cap* will allow a business to average periods of higher and lower emissions, but more frequent records are required. The PTE definition does not specify that restrictions cannot extend beyond a one-month period (unlike the MTE definition #2) but EPA guidance has directed the states that they have to do it that way.

As an example, a painting facility located in Dane county that could be a synthetic minor source might have the following emissions:

- ❑ MTE = 185 Tons per Year (TPY) of VOCs
- ❑ Actual Annual Emissions = 25 TPY VOCs
- ❑ Limit for PTE = 95 TPY VOCs

Dane county is an attainment area for ozone, so the major source level is 100 TPY of VOC emissions. It is not likely that this facility will reach their MTE because their actual emissions are very small. A limit of 95 TPY VOCs will not restrict their growth anytime in the near future. Also the facility knows from MSDS that their HAPs make up no more than 10 percent of the paints they use (this is not usually the case, but it makes the example simple). Ten percent of a 95 TPY emissions cap gives them a PTE cap of 9.5 TPY for all HAPs and keeps them below both the 10 TPY and 25 TPY major source levels for HAPs.

Because both of the restrictions on PTE make this facility a synthetic minor source, they can avoid more onerous requirements that might apply to them as a major source. Such requirements might be a MACT Standard that contains restrictive control requirements for HAP emissions. *SBCAAP has fact sheets for many of the existing MACT standards if you have questions on whether one might affect your facility.* The PTE restrictions do result in more onerous recordkeeping requirements for the business than a major source would have.

## PTE and Permit Requirements

According to EPA the synthetic minor limits that restrict PTE for this facility **cannot** be left in terms of *tons per year* of emissions. With a limit set on a long-term basis, the facility could not demonstrate compliance until the end of the year. EPA and DNR can base violations of the rules or permits on **each day** of violation. At the end of the year, if the facility emits 105 TPY instead of staying below the limit of 95 TPY in their permit, they would have a potential for **many** days of violation.

EPA prefers that a facility know at the end of each day whether they met their limit for the past 365 days. That would entail recording the amount of materials used each day, compiling records from

every process at the facility, and adding the totals to the running tally to calculate an annual total at the end of the day.

If the limit on PTE is an emissions cap, like the 95 TPY, it must be broken down to a cap over a period no longer than a monthly basis. Dividing 95 TPY by 12 months gives 7.91 tons per month. To make the limit more accurate it could be in terms of pounds or 15820 pounds per month.

95 tons/year ÷ 12 mo/yr = 7.916 tons/mo
7.91 tons/mo x 2000 lb/ton = **15820 lb VOC/mo**

You may notice that if you try to repeat this calculation, you may arrive at a slightly different number - up to 15833.33 lb/mo. It all depends on the number of digits that you keep after the decimal point as you complete the calculations. Rounding up to the whole number of 15833 lb/mo would be the highest acceptable result for an emissions cap that would be included in a permit.

With a monthly emissions cap the facility still needs to maintain records of the **daily** amounts used. They may not be required to perform the calculations until the end of each week or month. DNR can allow for more flexibility in how frequent calculations must be performed for those with long jobs (spread out over multiple days) or such a large number of coatings that it would be very burdensome to compile and calculate the data each day or week. Daily records would be maintained with the coatings or process operators and brought to a central location to perform the calculations at the end of the allotted time frame. The flexibility to average the monthly emissions over each 12 consecutive month period is also available in the event a facility has a fluctuating schedule. Then every 12 month average should balance out their high and low months.

As long as the daily records are available, there is still the ability to calculate daily emissions and then determine how many days the facility was truly over an emissions cap. This is a benefit to the facility when a cap is exceeded and it is determined that they were only in violation for 5 days of that previous month, rather than the whole month.

*Contact the SBCAAP or your local DNR permit writer if you have questions about permit conditions for synthetic minor permit limits. There is also an EPA guidance document "Potential to Emit: A Guide for Small Businesses" which does give excellent details on these calculations. Contact the SBCAAP for a copy.*

## *Contacts for More Information or Assistance.*

The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact one of the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608/264-6153 or Tom Coogan at 608/267-9214.

SMALL BUSINESS ASSISTANCE PROGRAMS
Serving Small Businesses and the Environment
in Wisconsin!

For further information on MTE and PTE Calculation Examples contact your DNR Regional or Service Center office shown on the **DNR Contact Fact Sheet**.